SYSTEMS II

Polytechnic of Central London 1973

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Richard Allen
Norman Dilworth
Malcolm Hughes
Colin Jones
Michael Kidner
John Law
Peter Lowe
David Saunders
Geoffrey Smedley
Jean Spencer
Jeffrey Steele

POLYTECHNIC OF CENTRAL LONDON
35, Marylebone Rd. London NW1 5LS. 01-486 5811
at **THE DESIGN ACTIVITY INTERNATIONAL CONFERENCE** 29th, 30th and 31st August 1973
and in the CONCOURSE GALLERY from 25th September - 13th October 1973

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Previous exhibitions by the
Systems group of artists

SYSTEEMI

Amos Anderson Museum, Helsinki 1969

MATRIX

Arnolfini Gallery, Bristol 1971

Welsh Arts Council Gallery, Cardiff 1971

Gulbenkian Theatre, University of Kent
Canterbury 1971

SYSTEMS

Arts Council of Great Britain major
touring exhibition

The Whitechapel Gallery, London	1972
Whitworth Art Gallery, Manchester	"
Graves Art Gallery, Sheffield	"
The Art Gallery, Billingham	"
The Laing Art Gallery, Newcastle	"
The City Art Gallery, Leeds	"
The Southampton Art Gallery	1973
The Museum and Art Gallery, Newport	"
The Museum of Modern Art, Oxford	"

Introduction

The occasion of this exhibition by members of the "Systems" group presented in conjuction with the "Design Activity" conference, seems to call for some attempt at analysis of the points at which the interest in systems and systematic design on the part of the painters and sculptors who comprise "Systems" coincides with similar interests on the part of the designers, architects and design theorists, whose forum this conference is. Just at the mention of the word "system" itself, a term now with a multitude of meanings and connotations - this being its weakness and its virtue - a series of special usages come immediately to mind of an architect, which are not irrelevant to the aesthetic problems posed to themselves by the "Systems" group.
Perhaps the oldest interest within the architectural profession in systems, is in proportional systems, sets of mathematical rules limiting the permitted dimensions or dimensional ratios of the constructional elements of buildings and their combinations into complete structures - the history of such systems in architectural design going back of course at least as far as the Greeks. The history of proportional systems is for the most part murky, mysterious and full of strange dark byways, the haunts of crackpots and fanatics, and not a subject to embark on here; part of the problem presented to the architectural historian being that such mathematical or systematic methods of composition tend to embody at least three different purposes of aspects, mixed together: the first a mystical/symbolic aspect, in which the purpose is to put the architectural work in harmony with the supposed underlying mathematical basis of the world or of the universe, with the mathematical order of Nature, or with the proportional organization of the human body; the second a more formal aesthetic aspect, in which the purpose is to create recurring proportional relationships or repeated units in the composition whose pattern will be recognisable or significant to the observer; and the third a functional aspect, in which the purpose is to limit and standardise the size of components used in the construction both to allow serial or mass production of units, and to ensure that such units can be fitted together in a variety of possible arrangements - what has become known in the modern building industry as "modular coordination". All three aspects are detectable for example in what is probably the most famous 20th century proportional system devised in architecture - and also incidentally for the composition of paintings and decorative schemes - Le Corbusier's 'Modulor'.

The working procedure of several of the artists in the 'Systems' group has many points of contact with the theory and study of such proportional systems and with their mathematical basis, and this accounts

Introduction

for a common interest in the mathematicsof symmetry operations and group theory of permutational problems, of set theory and in general with the 'new' mathematics of relation and structure (as opposed to the 'old' mathematics of quantity and number). The limitations of the repertoire of basic units or compositional elements in either case results in repetition and hence in the appearance of rhythmic structures, whose possibilities are enhanced by some finite (although often very extensive), and hence comprehensible number of potential variations, though permutation. There are obvious analogies with musical composition here; and indeed the principle of 'repetition with variation' is one that might be advanced as a universal principle of aesthetic ordering - if it is not so general as to be empty of interest - underlying the organisation not only of musical, architectural and pictorial works of a 'systematic' character, but serving also to explain in part the more modest aesthetic attraction of such things as decorative patterns, textures of natural objects, or collections of stamps or coins. Put in other words, one could state the same principle as that of 'expectation and surprise', with the regular repetition or rhythm serving to set up expectations, while the variations provide the surprises. Once again the variety of examples one could point to is virtually endless; but the musical field is an obviously rich source, while in architecture, town planning or landscape gardening, there is perhaps some equivalence or parallel with this type of expectation set up by rhythmic structures, in the expectations established by distant landmarks, glimpsed vistas, views seen through openings, which draw the observer on and through a series of spatial experiences, confirming or surprising these anticipations as he moves.

A second very familiar and related connotation of the word 'system' for architects is in the context of building or constructional systems: that is to say the limited sets of building components which are comprised by systems of prefabrication, which are typical of industrial production, and which are subject to the disciplines of 'modular coordination' just mentioned. Such components - bricks, panels, beams, door or window units - would typically be rectangular; or for the purposes of design could be regarded as being enclosed within imaginary rectangular envelopes. They would be organised and set out on a conceptual rectilinear three-dimensional grid, permeating as it were the whole space of the building. In an introduction to an earlier 'Systems' exhibition catalogue;[1] Stephen Bann has traced the art-historical pedigree or ancestral tree of the group back through the many individuals and overlapping and forming and reforming artistic groups who lie in what may loosely be called the Constructivist tradition.

One central figure in this network during the '20s was Theo van Doesburg , of considerable influence in painting but perhaps more so in architecture (despite the small number of his completed projects); one of the few individuals in this century to bridge the two arts succesfully.

Van Doesburg and the De Stijl movement's great contribution (following Wright) to architectural thought and practice was the development of a conception of interior space as freely flowing and interpenetarating, no longer imprisoned in a succession of box-like rooms, or hollowed out from the solid masonry mass of the building's structure, but instead defined, suggested, deflected, diverted by a series of (rectangular) floating spatial elements, walls, floors, ceilings - none of which came together necessarily at the edges but slid past and over each other, allowing the enclosed space to flow through and between. Such an architecture, difficult if not impossible to realize practically, at least in the pure form in which it was conceived by van Doesburg (the closest and best-known approximations being Kiesler's Cité en Espace, essentially a maquette or exhibition structure, and Rietveld's house for Mme.Schröder, which offered the partial illusion of a true Neoplastic architecture, but which was in reality supported by a concealed solid masonry construction) was the three-dimensional analogue of his elementarist paintings, where a series of simple rectangular elements were given play in fields defined by systems of regulating grid lines. That van Doesburg envisioned an extension of this same mode of composition into a fourth dimension, that of time, is evidenced by the series of drawings he made for an abstract film in 1930, 'From Surface to Space. Six moments of a space-time construction...'[2]

There is no doubt that van Doesburg's vision of a new kind of architectural space, like Mondrian's conception of the pictorial surface, rested on a semi-mystical philosophy giving special significance to the rectangle above all other forms, (as well as to the colour white, to the primary colour and so on). It is nevertheless interesting to notice the parallels, purely at the level of geometrical organisation, with the almost contemporary work of A.F. Bemis, an American pioneer of modular coordination, who during the '30s pressed for the universal adoption of a standard dimensional unit or module in building - a proposal which, as Bemis showed in drawings,[3] would imply a method of design in which the entire building volume would be ordered in relation to an imaginary three-dimensional grid of lines, along which the components would lie. The motives for Bemis's work, by contrast with those of van Doesburg, were purely utilitarian - the development of

cheap mass housing - and his proposed grid dimensions were too fine for the system to impose of itself any very coherent aesthetic ordering into the finished design. Nevertheless the implication of the different but related space-conceptions of both Bemis and van Doesburg, was in both cases of a constructive method of composition involving the assembly of some predetermined set of rectangular elements in arrangements which might in principle be varied according to transformational or permutational rules.

(Another branch of Bann's family tree of Constructivist painting leads back, in the middle '30s, to the Circle anthology[4], in which not only were the different strands of European and English art of a geometric or constructive tendency all brought together, but also - under the editorial hand of Leslie Martin - there was presented a view of directions in modern architecture which pointed to, and especially in Martin's own work, the aesthetic possibilities of prefabrication and of the variety of architectural forms produced by the premutation and combination of a few simple constructional elements.)

We can look at the possible extension of this method of three-dimensional composition into a fourth dimension - as imagined by van Doesburg - in either of two ways; as allowing the possibility of the temporal development of a three-dimensional structure, by permutational changes or transformations in time - with obvious analogies with music. (What this would mean in effect would be some kind of mobile or kinetic sculpture of a Neoplastic character, an art form which would present great problems technically; and van Doesburg's intention for an abstract film as indicated by the drawings would of course be a realization of the serial development only of a two-dimensional composition over time). Or alternatively, and perhaps more interestingly, we might view the method of transformational composition as a means of exploring the range of structures possible within some given set of generating rules; as a method of serchingthrough what in the terminology of programming and automatic problem-solving would be called the 'solution space'. So that a series of compositions seen together would imply not necessarily a progression in time, but an extension , in an imaginary spatial dimension, of the variety of permutational possibilities inherent in some chosen system. Such a conception could apply as well to a series of two-dimensional works, extended in a third imaginary dimension of permutational alternatives, as to a series of sculptures extended in a fourth dimension of possibilities. An interest in series of this character, as opposedto any implied temporal development, is evident in the work of several members of the 'System' group.

In building, although the practical theory - if one can use such an expression - of constructional systems has been very fully developed, it is fair to say that any mathematical theory of the transformational and permutational aspectsof such systems remains to be worked out - although tentative moves in that direction are now being made. With the recent introduction of computers into architectural design, the need for a fuller understanding of the geometrical logic of constructional systems has made itself felt. To take one example, from the work of my colleague Paul Richens in Cambridge. This is a set of computer programs whose purpose is to store a library of representations of the building components comprised by a building system known as the Oxford Method, and to allow the display and manipulation of these components, on the cathode ray screen, and their assembly into designs for eventual automatic conversion into working drawings. The great theoretical interest of the system lies in the inbuilt set of logical rules which govern and limit the ways in which the components - defined by their imaginary containing rectangular envelopes - can be brought together in conjunction to butt, overlap or join. These same components may be turned and spun into a variety of allowable orientations. It will be seen that the whole system amounts to a method for the production and manipulation of a two-dimensional representation of a three-dimensional geometry of boxes, organised according to a rectilinear grid - what Van Doesburg might recognise perhaps if he could see it (and if the screen could display primary colours instead of just black and white!) as a kind of Neoplastic sculpture machine; and which in its theoretical basis has suggestive parallels with and possibilites for painting and sculpture of a systematic character.

To return briefly to the subject of permutational and transformational two-dimensional works developed in time. It is perhaps not an enterprise in which any of the 'Systems' group themselves would whish to get involved (although Peter Lowe for example has indicated finding inspiration in the van Doesburg drawings already referred to), but there does nevertheless seem to be a rich unexplored vein of possibilities in the development of abstract geometric film, in the tradition begun by Richter and Eggeling in the '30s but shortly afterwards aborted, as an ideal medium for those of a 'systems' orientation working in the visual arts. Perhaps however the labour and technicalities involved are too daunting for any single individual.

Athird and much wider context - after proportional systems, and constructional systems - in which the word 'systems' has cropped up more recently in the literature of architectural theory, is in discussion of the possible applications or implications of 'system theory',

'general systems theory', 'systems analysis' and of the 'systems view in design and building. Much of this interest has been provoked, as in other disciplines, by the introduction of the computer accompanied by a corresponding excitement over cybernetics, artificial intelligence and the possibilities for computer-aided or automatic design.
Another simultaneous motivation for this interest comes from a crisis of confidence experienced within some parts of the architectural profession, and a belief that traditional methods of design have become inadequate to cope with the great complication of modern design problems, where the systematic interaction and interrelatedness of a great range of factors renders unworkable a simplistic division of the problem into manageable discrete parts according to preconceived categories. The chief and original proponent of this view, and champion of a systematic approach to design as a remedy, was Christopher Alexander, in his book Notes on the Synthesis of Form[5] (although recently it must be admitted Alexander has been standing on his head, and renouncing much of his earlier work.) The whole argument of Alexander's book is not relevant to the present discussion, but we might take notice of a number of points made by Alexander (and reinforced by Herbert Simon in his Sciences of the Artificial[6]) which have relevance to a'systems' approach to the plastic arts generally.
This 'system' way of thinking manifested in Alexander's and Simon's work can be traced back, through business administration applications, through the systems analysis and operations research of wartime industrial and military origins, through cybernetics - originally defined as the science of communication and control in animals as well as machines - to its epistemological source in biological thought; indeed the father of general systems theory, von Bertalanffy, was a leading biologist and prophet of, in his words the 'Organismic' (as opposed to either vitalist or mechanist) philosophy of biology, that is to say effectively a 'systems biology'.
The first of the points made by Alexander in connection with architectural design seem from a systems viewpoint, may be crudely summed up in the old phrase,'the whole is more than the sum of the parts'. Alexander stressed the importance of studying the hierarchical organisation both of the architectural problem - the interrelated structure of factors which the design must take into account and accommodate - and of the finished artifact, the building itself. The system in each case has properties which cannot be determined from a study of the individual parts in isolation. (It has to be said that Alexander is somewhat schizophrenic on this point, and simultaneously seem capable

of taking a contradictory, essentially atomistic view of architectural design - vide his Atoms of Environmental Structure - and of positing the existence of fundamental functional units of architecture which may be combined together without apparent consideration of the higher-level systematic properties which such combinations must of necessity possess.) As a biological idea, the whole being more than the sum of the parts, applied to organisms, is a very ancient one, but an idea that finds new articulation and precision in the modern applications of systems analysis and cybernetics to the study of for example physiological, development, behavioural ecological or evolutionary systems.

In the context of the types of formal visual or plastic system employed by the members of the Systems group, the matter of 'emergent properties' of a system not predicted or predictable from its basic geometric or colour elements, is ofthe utmost importance. It is precisely in the discovery of the surprising and elusive properties which the system is found to possess, once it is 'set in motion' so to say, that the interest and purpose of the work lies. It is in itself perhaps a surprising fact that systems which are the creation of the human mind are capable of surprising their creators, of being found to possess properties, features or relationships that were initially unknown and unanticipated Karl Popper has argued that this is a universal feature of human knowledge, that it attains a certain autonomy or independence from the thoughts of individual men. He points to the example of that most basic of man-made systems, the natural number system, and how it has properties, contains relationships that are the subject of a whole mathematical science, number theory, whose aim is to make conjectures and discoveries about these relationships. The work of art, as a product of the human mind, achieves a similar autonomy, Popper argues: '... though man-made, it creates its own interrelations. There is a beautiful atory about Haydn', he relates, 'who, when listening to the first chorus of his Creation, broke into tears and said "I have not written this".'

On not quite so sublime a plane, but nonetheless a serious and telling illustrationof the same point, is the 'Life' game invented recently by J.H. Conway - a computer game which is suggestive both for the visual arts, and for biological thought, and which has caught the imagination of designers as well as mathematicians. This 'game' is not competitive, but rather bears relationship to the so-called 'cellular' automata' studued by those interested in organic growth processes, as well as in the field of artificial intelligence. A square grid of indefinite extent is set out, and a few simple rules are established governing

whether in each 'generation' each cell of the grid is to be occupied or not - whether birth, continued existance or death of each individual unit shall take place - dependent simply on the conditions obtaining in one or more of the immediately neighbouring cells. Thus there are no overall rules, only local rules. With an appropriately chosen set of rules, the 'game' can be set in motion, and as gereration follows generation, strange and mysterious events begin to take place. Patterns grow and dwindle again, elements split off and move apart, or collide and join together, shapes glide across the field of view. The game is the subject of endless experiments and constant discovery of new and surprising configurations and behaviours. The point of relevance here, is that a system - and in the 'Life' game it is essentially a graphical or visual system - whose elements and rules of permutation and combination are very few and simple, can be found to have emergent properties of an immense and apparently un-ending richness and complexity, and can display an autonomy which is almost uncanny.

The second of the insights gained by taking a 'systems' view in the study of design processes, concerns the relationship of the artifact to its functional 'environment ' - what Alexander callsthe relationship between the 'form' and the 'context'. In the case of artifacts with straightforward and obvious utilitarian purposes - tools, instruments, machines, engineering structures and to a great degree buildings - this relationship, in a good design, is oneof functional appropriateness. Alexander uses the term 'good fit'. Although he does not himself make the analogy very explicit, it is clear from close reading of Alexander that this is an originally biological metaphor - the relationship of artifact to its functional environment being compared to the relationship of organism to (natural) environment, and the concept of 'good fit' being a sort of technological equivalent of biological fitness', in the Darwinian (or rather Spencerian) sense of the term as in 'survival of the fittest'. Alexander's model for the process of adaptation of form to context (7) in the design process, is drawn from W.R. Ashby's Design for a Brain one of the key works of cybernetic theory, and in particular from the design of an 'adaptive machine' invented by Ashby, the Homeostat, intended to display in a highly simplified fashion the basic cybernetic priniciples of either adaptation of physical form in organic evolution, or else of adaption through learning, there being a strong formal cybernetic similarity between the two processes.

In painting, sculpture or the fine'arts there is obviously no simple equivalent of this functional context or functional environment for

the work, as there is in building or the useful 'arts. Nevertheless I think that this basic biological or systems model of the design or creative process can still be helpful in relation to aesthetic theory quite generally. The implication of the metaphor or model in terms of process, is of a cyclic procedure, in which some preliminary sketch design of a tentative nature is produced first of all, is then tested against its 'environment': as a result of the performance of the design in these tests, is modified, redesigned, adjusted, elaborated; is then subjected to renewed or further tests; and so the process goes on, round and round, until some sort of resolution or equilibrium point is reached (or possibly indefinitely). In the original biological context, this is the process of evolution. The tentative 'design modifications' are variations in the form of the organism, or in its behaviour, produced as a result of genetic mutations; and the tests to which these variations are subjected are the tests of competition and reproductive success whose outcome constitutes natural selection. The variations which are retained are those which confer some selective advantage, which confer fitness, whichconstitute appropriate and useful adaptations of the organism to its environmentand way of life.

In the context of architectural, engineering or industrial design - though one should be wary of drawing any too simplistic or easy analogies with natural evolution; since the mode of transmission of 'hereditary information' in the two cases is fundamentally different - the equivalent process would consist of the production of some preliminary sketch design, which is subjected to tests of a functional nature - these might be actual experimental tests, of strength, performance or whatever, carried out on a prototype or physical model; or might, more probably, be theoretical tests, engineering calculations, informal criticisms or appraisals of the proposed design - as a consequence of which the design is changed, improved, developed, then tested again and so on round the cycle. Such a cyclic model of the design process has become almost commonplace in the literature of 'design methods' nowadays, and I am by no means the first to point to the parallel between such a view of design method, and Karl Popper's conception of scientific method and the accumulation of 'objective knowledge' in general - again a dangerous analogy and one that must be watched with care - the essence of which he has encapsulated in a simple notation thus:

$$P_1 \rightarrow TT \rightarrow EE \rightarrow P_2$$

In Popper's explanation: 'That is, we start from some problem P_1, proceed to a tentative solution or tentative theory TT, which may be (partly or wholly) mistaken; in any case it will be subject to error-elimination, EE, which may consist of critical discussion or experimental tests; at any rate, new problems P_2 arise from our own creative activity: and these new problems are not in general intentionally created by us, they emerge autonomously from the field of new relationships which we cannot help bringing into existence with every action, however little we intend to do so.'(8) This is a diagram which Popper employs repeatedly to show the underlying formal or 'systems' similarity of the processes not only of scientific method but also of , variously, evolutionary adaptation, trial-and-error learning, perception and creative activities of all kinds - in general, all processes by which genuine newness emerges in life (and not just the novelty of recombinations of preexisting elements or parts). In other versions the TT standing for 'tentative theories' in the scientific context, is replaced by TS, 'tentative solutions'. In the interpretation of the diagram in terms of organic evolution, these TS tentative solutions, are the variations of form or behaviour, produced essentially randomly through mutations, as possible responses to the P_1, the 'problems' posed by the exigencies of the organism's surroundings, its environment; and the EE, the error elimination, is of course natural selection.

Iam encouraged to think that all this has some relevance to painting and in particular to the work of the Systems group, by a number of things. First of all because Popper himself (and, under his inspiration, Gombrich) both think that it does: even if they have in mind a much less stictly controlled and planned method of production than that used characteristically by Systems. 'It is perhaps not uninteresting to see that artists, like scientists, actually use this trial-and-error method. A painter may put down, tentatively, a speck of colour, and step back for a critical assessment of its effect in order to alter it if it does not solve the problem he wants to solve. And it may happen that an unexpected or accidental effect of his tentative trial - a colour speck or brush stroke - may change his problem, or create a new subproblem, or a new aim: the evolution of artistic standards (which, like the rule of logic, may become exosomatic systems of control) proceeds also by the trial-and-error method.'(9) And second it is precisely what at least one member of the group, Malcolm Hughes, has said about his own work on a previous occasion; to quote: "It must not be overlooked that often, although not always, the artist is, during the dialogue between concept and object, in the role of spectator of his own

creation - he is his own midwife - and there exists a continuous feedback system that both extends and modifies (by a self-generating, self-regulating, cyclic activity) all three ('conceptual/intuitive', 'physical/objective', and 'perceptual/psychological') levels. This continual re-energizing can be presented as an 'open system'.[10] And Hughes goes on to quote a passage from Emery's System Thinking on the characteristics of open systems[11]" (of which living organisms are the outstanding example) which owe their state of homeostasis or internal stability to a continual process of adaptation so as to maintain a dynamic balance with their environment.

It emerges then that if Popper's model can be usefully applied in the arts, that the phase of 'error elimination' EE which in utilitarian design consits in experimental testing of the prototype or tentative solution against the given functional requirements for that artifact or work, has an equivalent in painting or sculpture in what Popper in the passage quoted refers to as 'artistic aims and standards'. That is to say it is not the elimination of functional failure or inadequacy that is involved, but the elimination of undesired effects.

The two processes are both critical processes, but critical according to different kinds of criteria and by different standards.

What is very fertile about this Popperian view, and particularly I think in relation to the System group work, is that it places enphasis on problems, and on the continuous process of exploration by which one problem leads to the next, and the solution of one serves only to give rise to several more. What is important is to have the right problem, or to be working on a 'good' or interesting problem; and what is not important is any kind of final statement of complete resolution - which from this philosophical perspective in any case is an unattainable aim. It means that the individual work cannot be seen as springing mysteriously, fully formed and finished, from some unknown inspirational or creative source; but instead must be set in the development of the oeuvre of the artist as a whole, that artist's work set, as with Systems, in the context of the working group with which he is aligned, and the group's work viewed in the historical and evolutionary tradition (Biederman's 'Art as the Evolution of Visual Knowledge') in which it is situated. It provides an indication of the crucial role of chance, of random search, of trial-and-error in all creative enterprises. But in counteraction to this random element, it emphasises the importance of criticism and self-criticism, of a search bounded by limits, of freedom within a discipline; it suggests an art consisting in a continual dialogue and interplay of ideas, a 'running argument, a chain of linked problems and their tentative solutions, with us in the present walking forward, if we are lucky, holding one end.[12]

1. Catalogue to 'Systems' travelling exhibition, Arts Council 1972-3
2. 'Arithmetical Composition', from T. van Doesburg, 'Film as Pure Form' 1926. Reprinted in Form No.1, Summer 1966, P.5
3. A.F. Bemis, The Evolving House, M.I.T. 1933-6
4. N.Gabo, B. Nicholson, L. Martin (eds.), Circle, Faber 1937. Republised 1972
5. C. Alexander, Notes on the Synthesis of Form, Harvard, Cambridge Mass. 1964
6. H. Simon, The Sciences of the Artificial, M.I.T. 1969
7. W.R. Ashby, Design for a Brain, Chapman and Hall, London 1952
8. K. Popper, 'Epistemology without a Knowing Subject' printed in Objective Knowledge: An Evolutionary Approach, Clarendon Oxford 1972, p.119
9. K. Popper, 'Of Clouds and Clocks', printed in ibid., p253
10. M. Hughes in Catalogue to 'Systems' travelling exhibition. op. cit . p.23
11. D. Katz and R.L. Kahn, 'Common Characteristics of Open Systems', Systems Thinking, ed F.E. Emery, Penguin 1969, p.103
12. B. Magee, Popper, Fontana London 1973, p.67

Philip Steadman

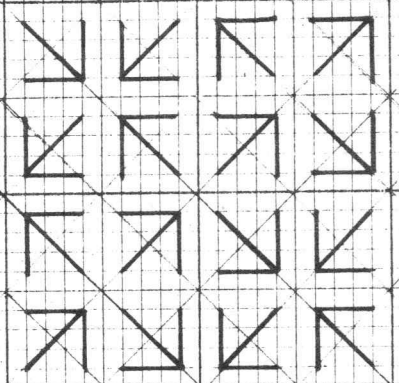
Philip Steadman (born 1942) came to architecture from a mathamatical background. He followed the architectural course at Cambridge and since 1965 has been engaged on a major research programme concerned with University planning.

He was founder and co-editor of 'Form', a research magazine of the arts, and has co-authored 'Four Essays on Kinetic Art', and 'A Theoretical Basis for UniversityPlanning', as well as numerous papers.

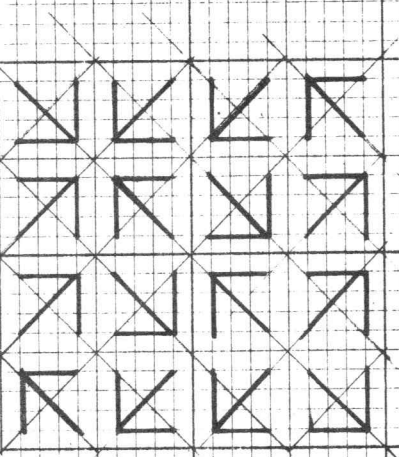
He was, with Lionel March co-author of 'The Geometry of Environment', and at the present time is engaged in research for The Academy of Natural Sciences, Philadelphia. U.S.A.

Richard Allen

a.



b.



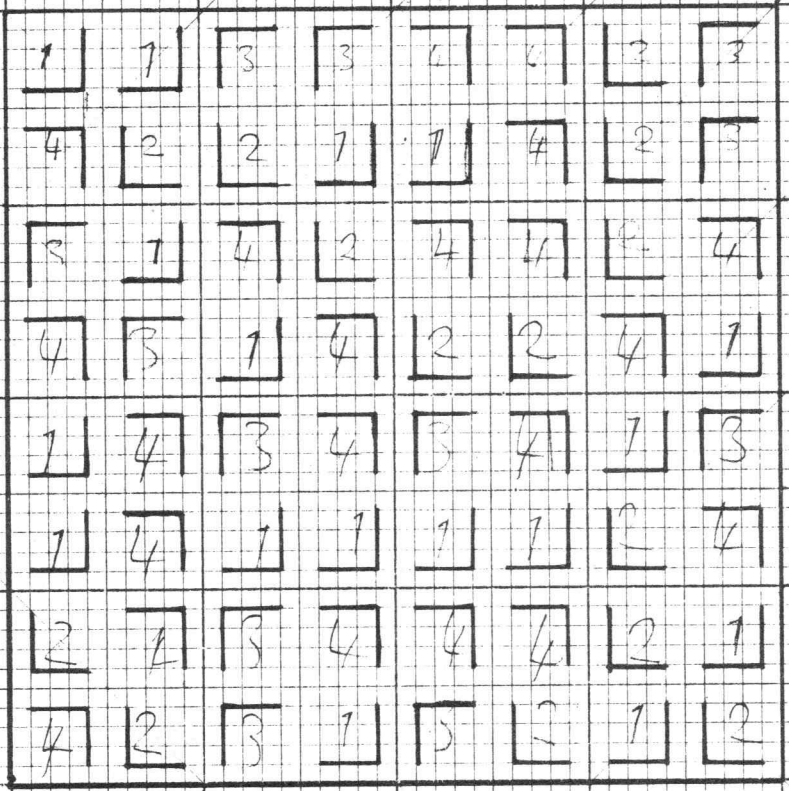
Simple progressions of units

1. 2 3 4

fig a. 1234/2341/3451/4153.

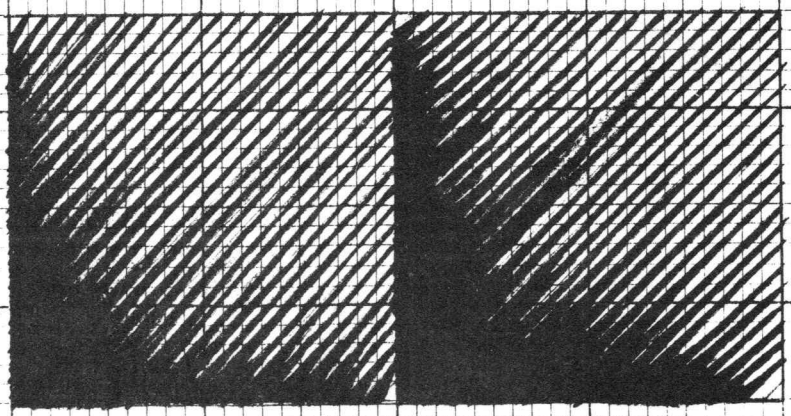
fig b. 1223/4314/4134/3221.

c.



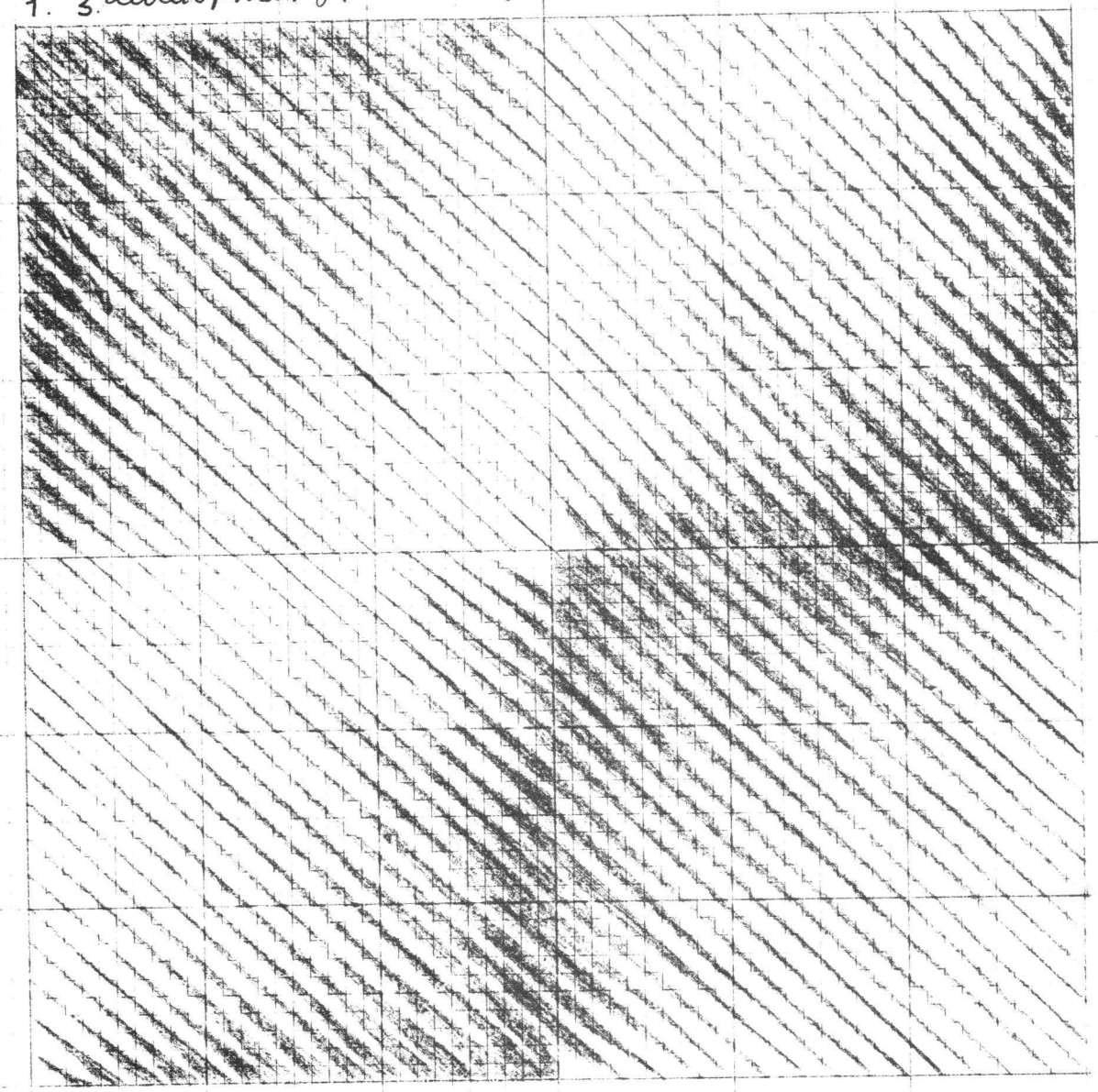
a random sequence using the same units 1.2.3.+4.

example of development and presentation of a section 2/2.



3. 1.

1. 3. development of four units.



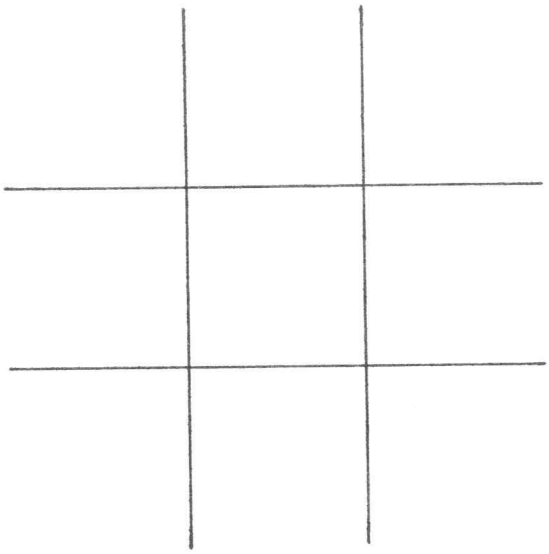
Born Worcester 1933
Worcester School of Art 1955
Bath Academy of Art 1957
Italian Government Scholarship 1960
Commonwealth Scholar (India) 1966
Fellowship in Art, Univ.of Ssx.1967
Exhib.Consultant Poly. of C.London
Visiting Lecturer Royal Col.of Art

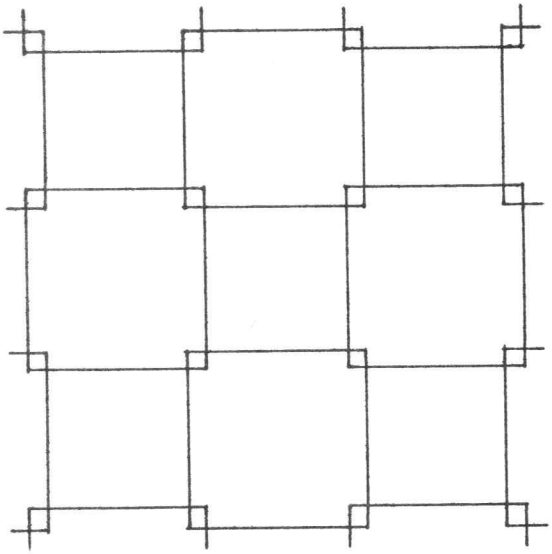
Exhibitions

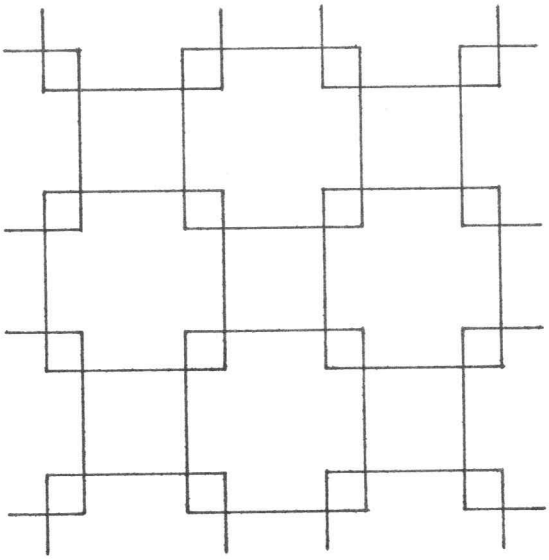
Seven Sixtyfour, McRoberts & Tunard Gallery, London, 1964
Jeune Peinture Anglaise, Gallery Motte, Geneva, 1965
'Contrasts' McRoberts & Tunard Gallery, 1965
Summer Exhib., Redfern Gallery, 1965
John Moores Liverpool Exhib., 1965
'Movements', Manchester City Art Gallery & Sheffield University 1966
Kinetic Art, Herbert Art Gallery, Coventry, 1965
Arts Council for N. Ireland, Open Painting Exhibition 1966 (prize)
'Ten Sixtysix' McRoberts & Tunard Gallery, London 1966
Univ. of Sussex Arts Centre, 1966
Kinetic Art, N. W. Arts Festival Londonderry, N. Ireland, 1967
Ritchie Hendricks Gall., Belfast, '67
Kinetic Art Exhib., Ulster Museum'67
Bradford City Art Gallery, 1967
John Moores Liverpool Exhib. 1968
British Painting Institute of Contemporary Art exhib. touring US,'68
Artists & Architecture, The Building Centre, London 1968
The 1st British Print Biennale, 1968
'British Movements '69' Onnasch Gallery, Berlin, 1969
Gelsenkirchen Museum, W.Germany 1969
British Prints, Nantenshi Gallery, Tokyo, 1969
The Gardener Centre Inaugural Exhibition, Univ. of Sussex, 1969
'Matrix' Arnolfini Gal.Bristol 1971
Angela Flowers, July 1971
Lucy Milton Gallery Movements 1972
Bear Lane Gallery, Oxford, 1972
Hanover Graphics
Systems, Whitechapel Gallery, London & Arts Council Touring Exhib., 1972
Systems Drawings, Lucy Milton Gallery, 1972

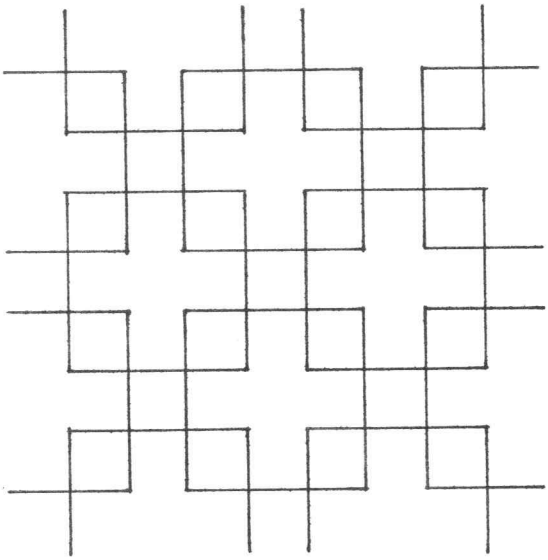
Collections

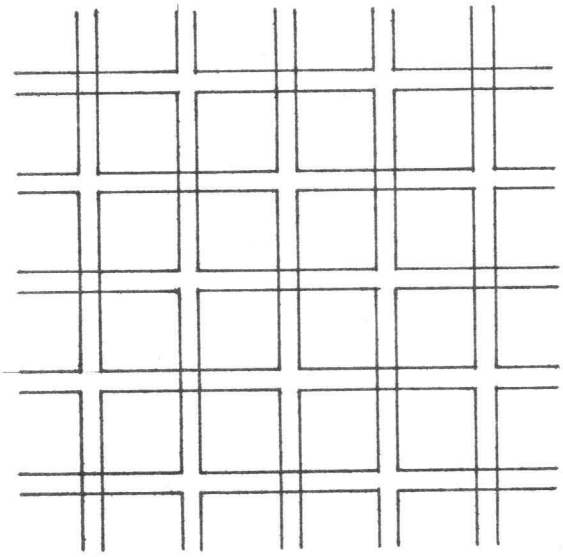
Peter Stuyvesant Foundation
Gallery Motte, Geneva
Fondazione Pagani, Milan
Skopje Museum of Modern Art
Ferens Art Gallery, Kingston
Croydon Education Committee
National Academy of Art, New Delhi
University of Sussex.
Gemeentmuseum, Arnhem, Holland
The Ministry of the Environment
Oxfordshire Education Authority
General Motors
University of Vermont, USA
Jacksonville Art Mus., Florida, USA
Rensselaer Institute, New York
Bloomfield Art Assoc. Michigan, USA
Museum of Modern Art, Rome
Chase Manhatten Bank
Seven commissions in relation to architecture have been carried out

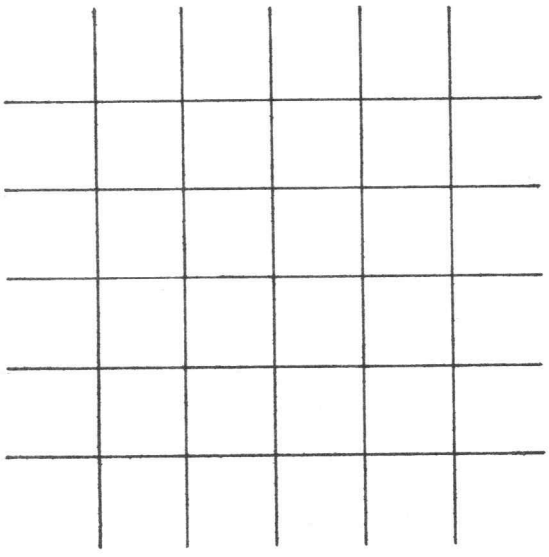












Norman Dilworth

174 Camden Rd., London NW1
485 1909

Exhibitions:
1966 Grosvenor Gallery
"Experiments in Form"
Axiom Gallery "Constructions"
Warwick University
"Kinetic Art"
Cardiff "Structures 66"
1967 Expo '67 Montreal
1968 Redmark Gallery London (1-man)
Camden Arts Centre
"Art for Export"
1969 Birmingham Midlands Art Centre
Birmingham Ikon Gallery
Oxford Museum of Modern Art
Liverpool Bluecoat Chambers
1970 Galerie Nouvelles Images, The Hague (one-man)
1971 won Sculpture for Haverfordwest Competition Welsh Arts Council
1972 Galerie Nouvelles Images, with Ad Dekkers, Peter Lowe and Truus Wilmink
Lucy Milton Gallery, London
1973 Leicester Museum & Art Gallery
Wolverhampton City Art "
"Themes & Variations"
I.C.A. London "Summer Studio"
Galerie Swart, Amsterdam
"4 English Systematic Artists" with John Addison, Malcolm Hughes and Jeffrey Steele
Lucy Milton Gallery Oct. 9
one-man exhibition

List of Works:
Seriegraphs: Series 1/A/1973
22" x 22" black on white

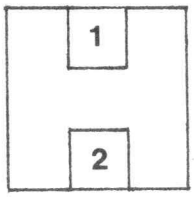
no. 2
no. 3
no. 4
no. 5

Reliefs: Series 4/A/1973
22" x 22" clear perspex

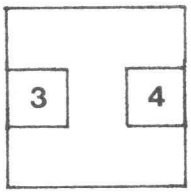
no. 1
no. 2
no. 3
no. 4

The design used for this exhibition involves constant elements with varying relationships. The constant elements are squares of equal size arranged on a grid, repeated, and overlaid at right angles to each other.

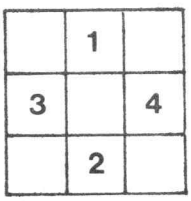
A



B



A + B



A + B represents the first stage in the series - here the intervals are equal to the squares, so the result of the 90^{o} rotation is a regular grid of lines. At each subsequent stage, the intervals diminish, until, in two dimensions, the squares meet to produce a further regular grid, and in 3 dimensions (where the line has no width) disappear.

Malcolm Hughes

Born 1920, Manchester.
Studied at Manchester Regional College of Art and the Royal College of Art, London.
At present teaching at the Slade School of Fine Art, Chelsea School of Art, Visiting Lecturer Dept. of Fine Art, Reading University.

RECENT EXHIBITIONS:

1969: SYSTEEMI SYSTEM, Amos Anderson Museum, Helsinki, Finland.

1971: 4 Artists: reliefs, constructions and drawings, Victoria and Albert Museum, London.
MATRIX, Arnolfini Gallery, Bristol.

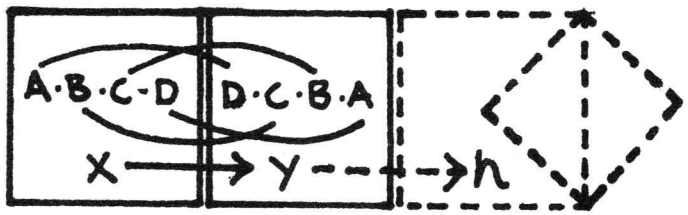
1973: City Art Gallery, Leicester.
Plus Kern Gallery, Gent, Belgium.
Studio la Città, Verona, Italy.
Galleria L'Approdo, Turin, Italy.
Galerie Swart: 4 English Systematic Artists, Amsterdam, Holland.

".....I agree with Brouwer that the sequence of natural numbers is a human construction. But although we create this sequence, it creates its own autonomous problems in its turn. The distinction between odd and even numbers is not created by us: it is the unintended and unavoidable consequence of our creation. Prime numbers of course, are similarly unintended autonomous and objective facts; and in their case it is obvious that there are many facts here for us to discover....."
Karl Popper: "Objective Knowledge" p.118, Oxford UP., 1972

Recent work has been centred around an interest in a 'number structure' incorporating prime numbers. The specific drawing illustrated uses the sequence of natural numbers, including the primes, from zero to twenty as the basic thematic material. In the drawing the tonal coding makes visual where in this sequence the primes occur. (in X : C,D in Y : A,D) This tonal sequence also provides information necessary for the construction of the relief - i.e. those decisions concerned with ordering of physical space, light, position and scale.... etc.

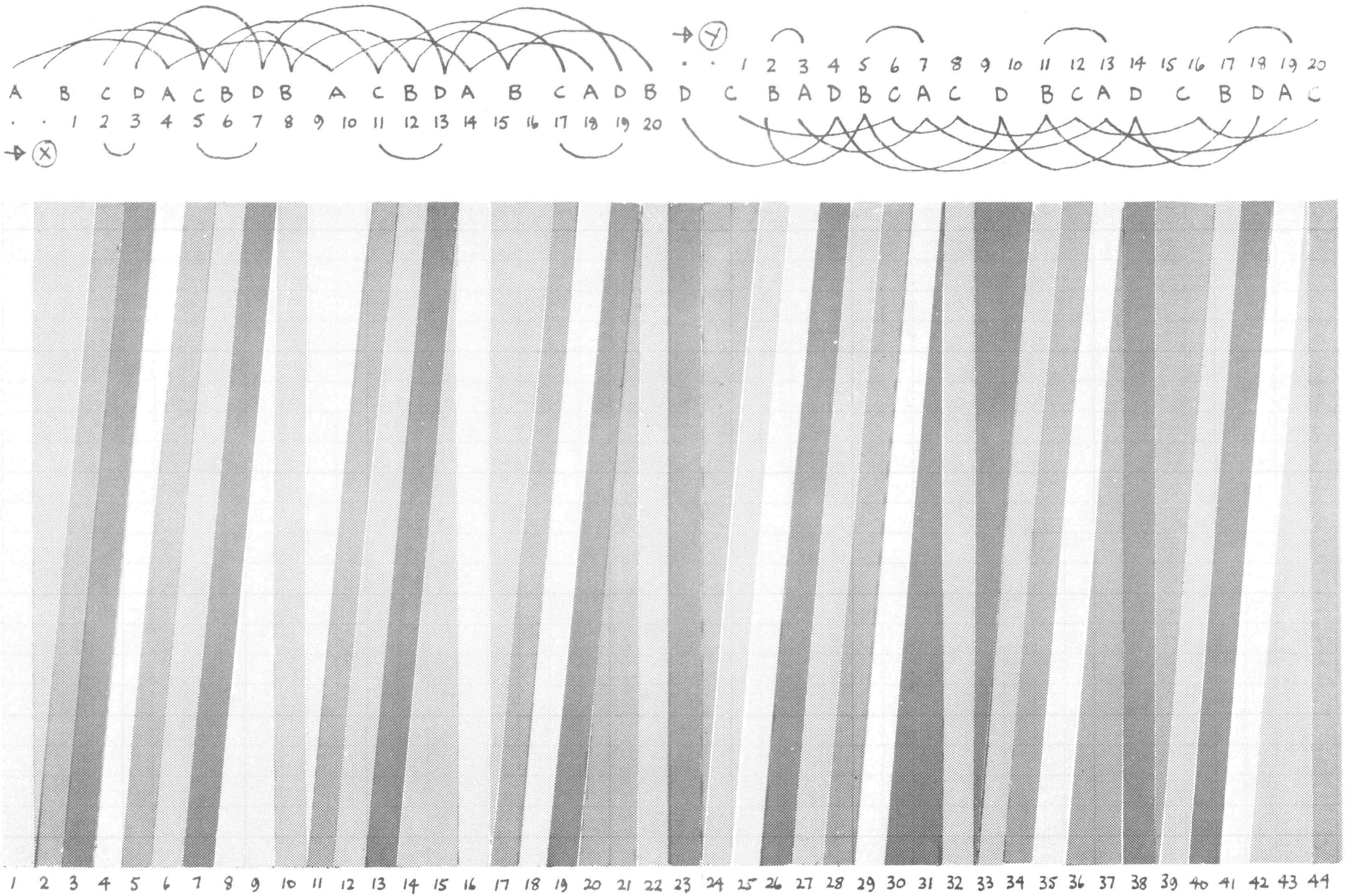
This particular work is the outcome of further operations upon the basic unit of information. All that is stated in X, the left hand square, is transformed into Y, the right hand square. In an obvious way other transformations could be carried out upon this unit of information and dependent upon their nature the specific character of the resultant artifact would emerge.

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20



Here the nature of the transformation and the use made of it results in a visually continuous sequence which, in keeping with the original interest, the prime numbers, is capable of extension and development.

" ....A very obvious example is a garden. Even though it may have been planned with great care, it will as a rule turn out partly in unexpected ways. But even if it turns out as planned, some unexpected interrelationships between the planned objects may give rise to a whole universe of possibilities, of possible new aims, and of new problems..."
Karl Popper: "Objective Knowledge" p.118, Oxford UP., 1972


A B C D A C B D B A C B D A B C A D B D C B A D B C A C D B C A D C B D A C
. . 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
X
Y
. . 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44

Colin Jones

Born 1934.

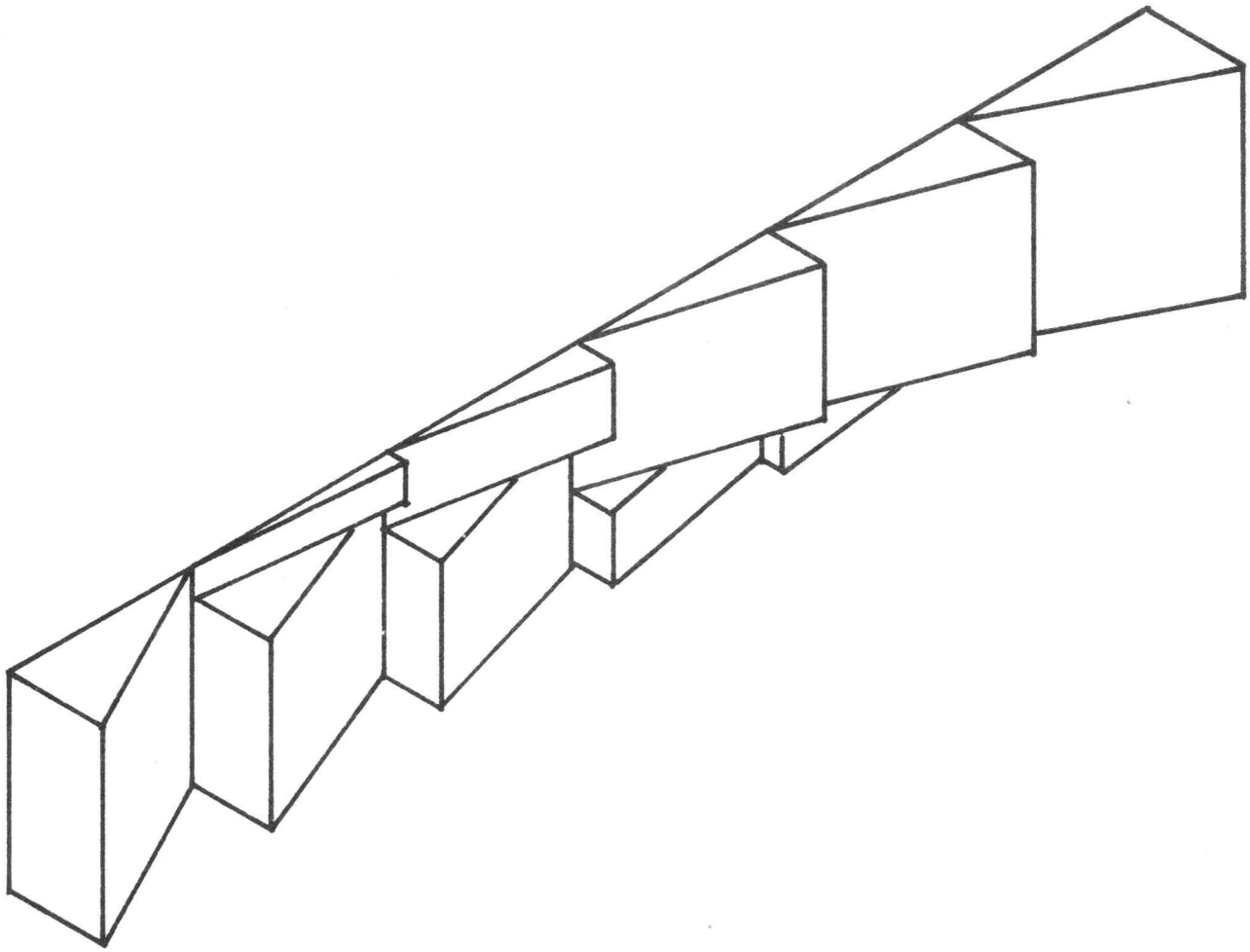
Lives and works in Leicester.

Teaches in the Schools of Fine Art and Industrial Design at Leicester Polytechnic.

Constructed work included in English Construction exhibitions since 1962, including the recent 'Systems' exhibition at the Whitechapel Gallery, London, and the subsequent Arts Council Tour.

Structures based on logical programmes, developing the properties of the articulated wall.

RELIEF STRUCTURE 1971/73.
'Oppositions'.



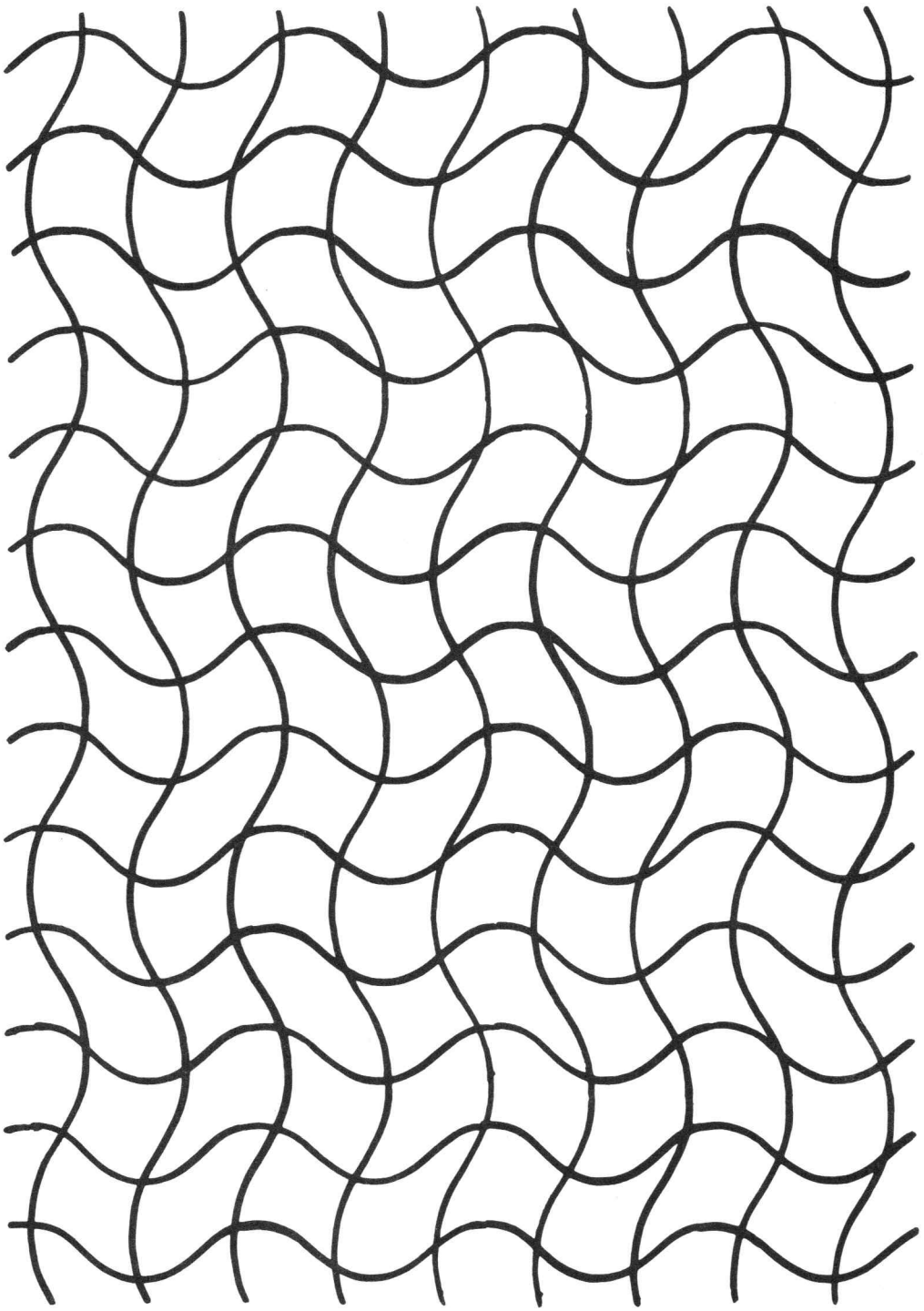
Isometric drawing of Wall Relief.

Michael Kidner

Born Kettering, Northamptonshire, 1917

Began showing "After-image" paintings at the AIA gallery in 1959.

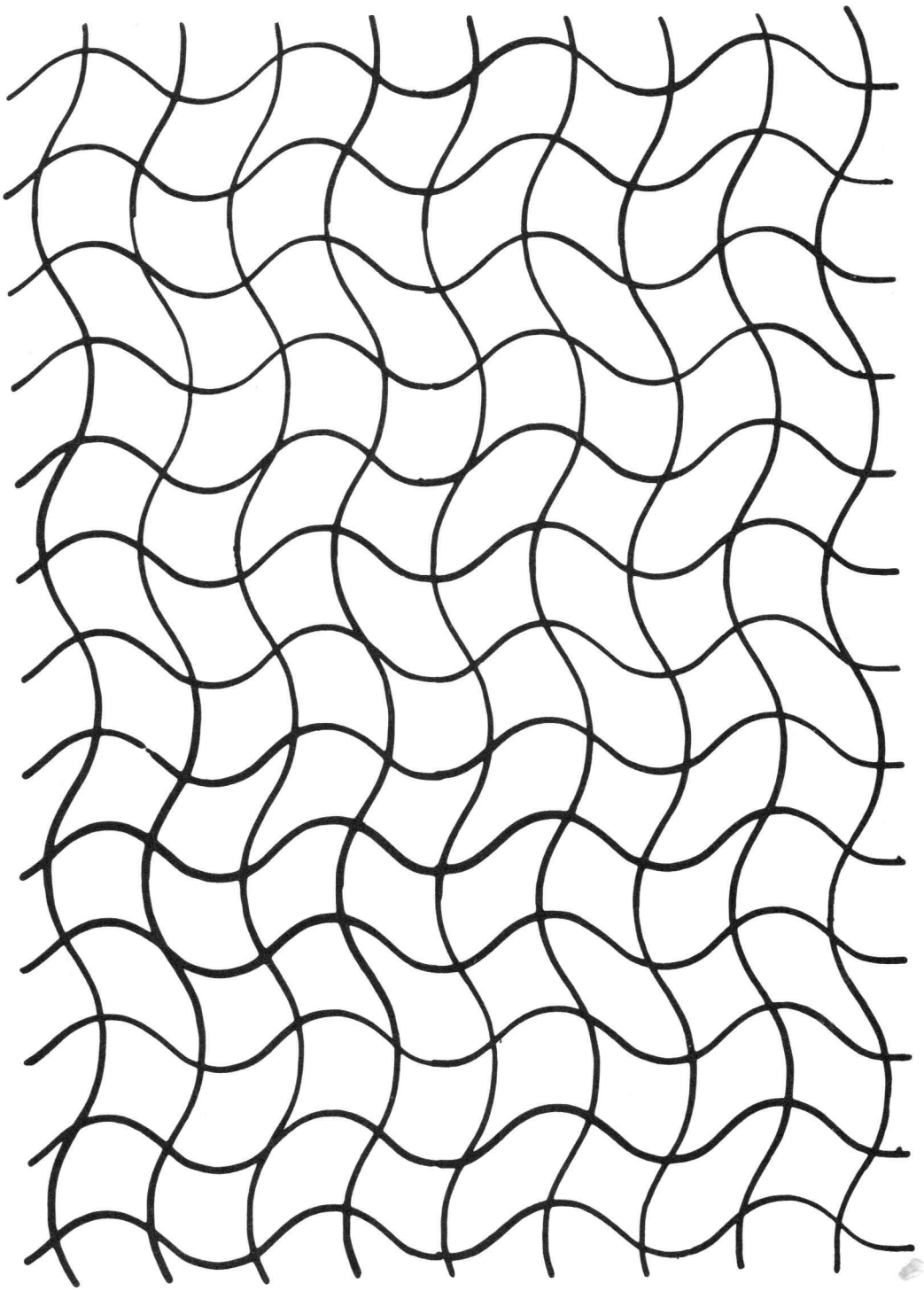
Since then the emphasis in his work has shifted gradually from optical colour to a more general interest in visual syntax.



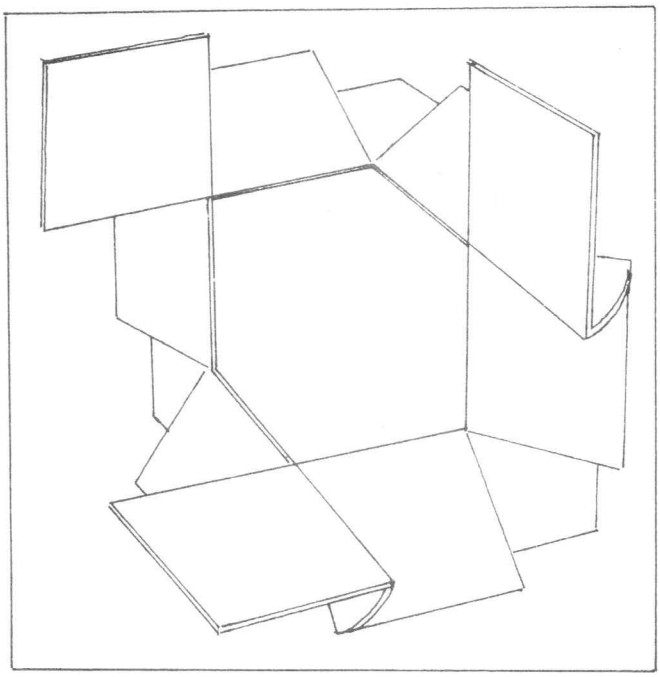
I find that a grid composed of wavy lines pertains to the infinite quality of an Ad Reinhart painting.

The endless number of linear intersections both offer and resist any sort of visual resolution.

The drawings I have reproduced are two examples from a set of phased wave patterns which superficially appear similar.



John Law

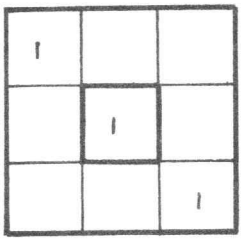


John Law. 385 Clapham Road
London. SW9 9BT.

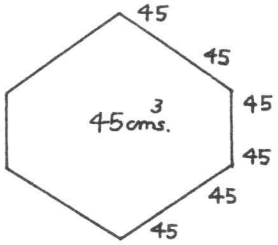
Perspective of the basic construction in the series shown opposite. 15cms^2 units enclosing a 15cms^3 space. Arcs 45^o

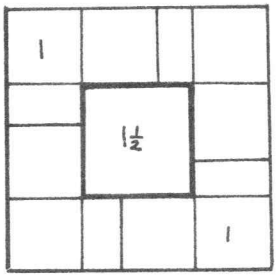
Looking at a picture of a horse, a spectator can compare it with other equine portraits and with real nags he may have seen. Looking at a piece of abstract art, he might try to identify the source of the abstraction, some aspect of the visual world, or a mathematical idea perhaps, and he might try to follow the process of abstraction. These activities, the establishing of criteria, are much more difficult when the spectator examines a construction which represents nothing else and shows no obvious process of abstraction on its well-finished surface. The situation is not helped by the tradition which has grown up in England of eschewing all titles, slogans and other readily available clues to the interpretation of the works. Notes are provided of course, for this is a rational art form, but these - usually in the densest english - are neatly encatalogued, to be perused at home if one makes the investment. The combination of inscrutable art-work and heavy-weight catalogue writing doesn't communicate, the well-intentioned spectator remains on the emotional response-level to the work, unable to extract the keys to the visual conundrum in front of him. Braque painted trompe-l'oeil nails at the top of some cubist works to provide something immediately intelligible. One can go some way towards involving the spectator in one's formal games by telling him the rules. By providing the spectator with a number of variations of a basic idea it is possible for him to become involved with the work on a formal level as soon as he has spotted the first similarity. By cross-reference and comparison he can then work out the whole composition.

The drawings on the facing page show the compositional ideas behind a group of 5 recent works. An enlarged and modified version accompanied the pieces on exhibition. The basic form was invented while I was playing with some pieces derived from an earlier work which was a series of rectangular planes linked by arcs of a semi-circle. In the smallest piece the structure is made of units having the same cross-sectional area as the space they enclose. Going from 1 to 5 one sees alternate expansion of space then structure as shown in the first column of drawings. The second column shows the variations in the angles of the areas separating the planes. The 5 pieces range in size from 45 to 90cms^3 the largest is therefore 3 times the volume of the smallest.

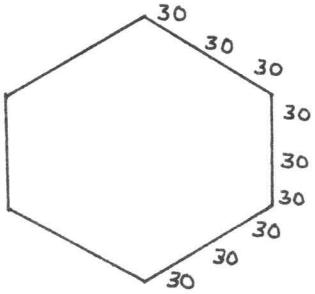

1
1
1

1.


45
45
45
45
45
45
45 cms.3


1
1½
1

2.


30
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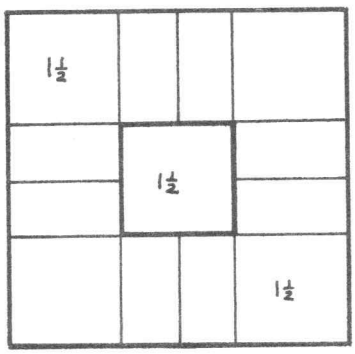
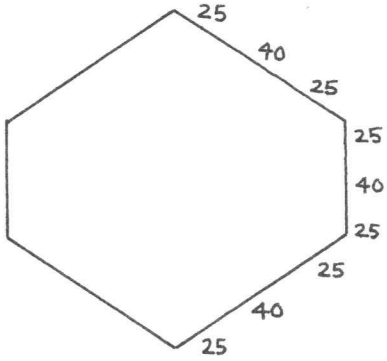

1½
1½
1½

3.


25
40
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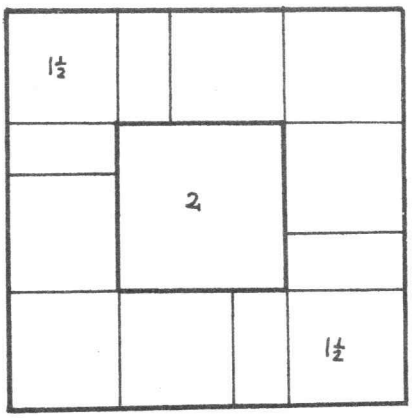
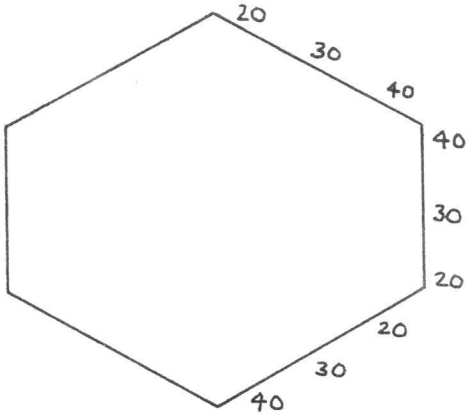
25


1½
2
1½

4.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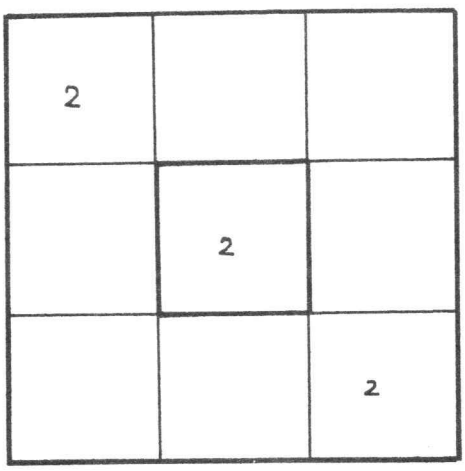
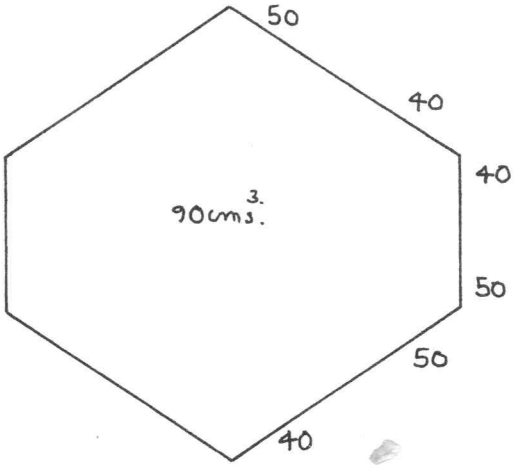
40


2
2
2

5.


50
40
40
90 cms.3
50
50
40

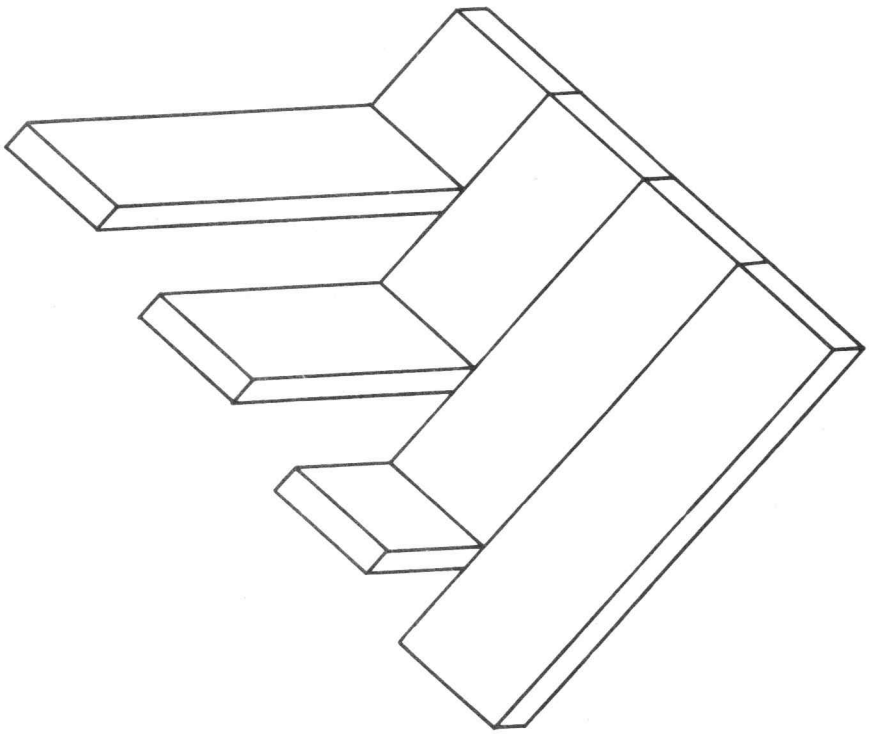
Peter Lowe

The constructed object represented by the isometric drawing on the opposite page refers to progressions of actual volumes. It is in contrast to the graphic works that I am exhibiting which although obviously to do with progression, neither describe existing objects nor suggest volume. Such ideas could be applied to other means but here they are resolved as drawings. To make the drawings durable and as a simpler alternative to frames and glass they are engraved into plastic.

born 1938. London. Lives 27 Lanercost Road, London. S.W.2

exhibitions

1963 a.i.a gallery, plus minus inventions, London
arts council tour, construction england
a.i.a gallery the geometric environment, London
1966 axiom gallery, constructions, London
i.c.a gallery, relief structures, London
1967 arts council tour, unit-series-progression
1968 constructions from the arts council collection
maison de la culture, cinetisme-spectacle-environment, Grenoble
1969 amos andersohn museum, systemi, Helsinki
1970 de zonnenhof, space dimensions, Netherlands
1971 arnolfini gallery, matrix, Bristol
1972 whitechapel gallery, systems, London
lucy milton gallery, systems-drawings-reliefs, London
salon des realites nouvelles, Paris
galerie nouvelles images, the Hague



Peter Lowe. Drawing of a construction 1973.

David Saunders

BIOGRAPHICAL NOTES

1956/62	Studied at St. Martin's School of Art and Royal Academy Schools.
1965/68	Living in Wales - evolving structural ideas.
1970	Artist in Residence. University of Sussex.
	Became interested in musical performance. Member of Portsmouth Sinfonia and Ross & Cromarty Orchestra.
1971	Working on project for Arts Council "Systems" Exhibition.
	Teaching at Portsmouth Polytechnic.
1972	Working in Amsterdam.
1973	Teaching at Liverpool Polytechnic.
	Playing in Majorca Orchestra.

SELECTED EXHIBITIONS

1967	"Survey '67", Camden Arts Centre.
	"Edinburgh 100".
1969	Greenwich Theatre Art Gallery (one-man exhibition).
	"System", Amos Anderson Museum, Helsinki.
1970	Gardner Arts Centre, University of Sussex (one-man exhibition).
1971	"Matrix", Arnolfini Gallery.
1972	"System" Arts Council Exhibition, Whitechapel Gallery and subsequent tour.

David Saunders

Geoffrey Smedley

Born London 1927.
Now teaching Department of Fine Art, Portsmouth Polytechnic.

One man exhibitions;

1965 AIA London

1969 AIA London

St. Paul's School Gallery, London.

Some recent group exhibitions:

1966 Structure '66, Welsh Arts Council

Experiment in Form, Grosvenor Gallery, London

1967 Sculpture in the Round Tower

Constructions, Arts Council of Great Britain (tour continues)

1971 Matrix, Arnolfini Gallery, Bristol

Art Spectrum South

Forma Viva, Pirano Yogoslavia.

1972 Systems, The Arts Council of Great Britain

Systems, Lucy Milton Gallery

1973 Eleven Sculptors One Decade, Arts Council of Great Britain

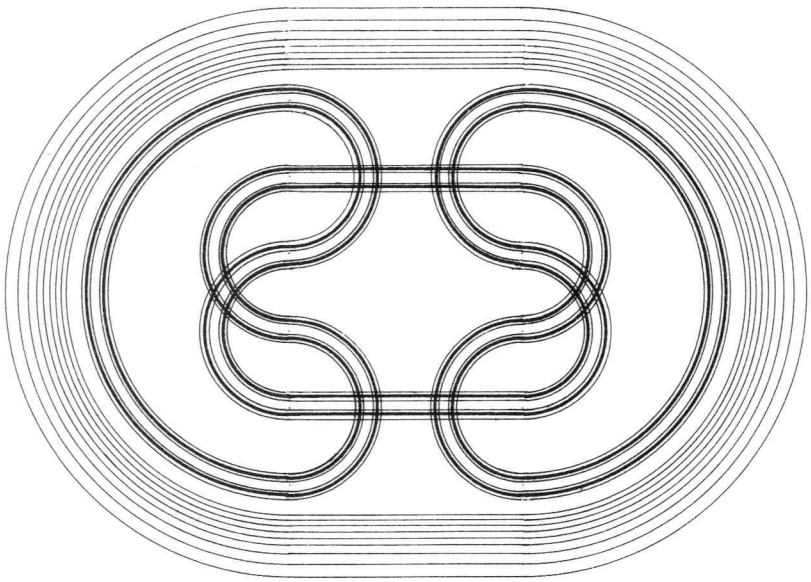
1973 Open Field. S.A.A.

Contributor to the VIIth Congress of the A.I.A.P. on the 'Role of the Artist in the Environment'. Bulgaria, 1973.

From time to time artists are asked questions which are not essentially artistic ones. I mean questions which have more to do with politics or the humane sciences. If an artist is rash enough to answer such questions then he does so as an amateur. However, it is not as an amateur that he understands that there is a reciprocal relationship between what is done, and how it is done. Such understanding is the provenance of artistic freedom. Maybe we should re-phrase the old song to run "...it is what you do that's the way that you do it..."

If the world is becoming a nonsense, as I believe it is, then we must recognise that what the world is (or has become), IS the way that it's done. And to say so is neither tautological nor simplistic, but a question of indivisible is-ness.

Geoffrey Smedley



Jean Spencer

Born 1942. Studied at Bath Academy of Art, Corsham.
Now teaching Art Dept., Berkshire College of Education.

One man exhibitions:

1965: Bear Lane, Oxford.

1969: University of Sussex, Brighton.

Some recent group exhibitions:

1967: Axiom Gallery, London:

'Unit, Series, Progression', Arts Council;

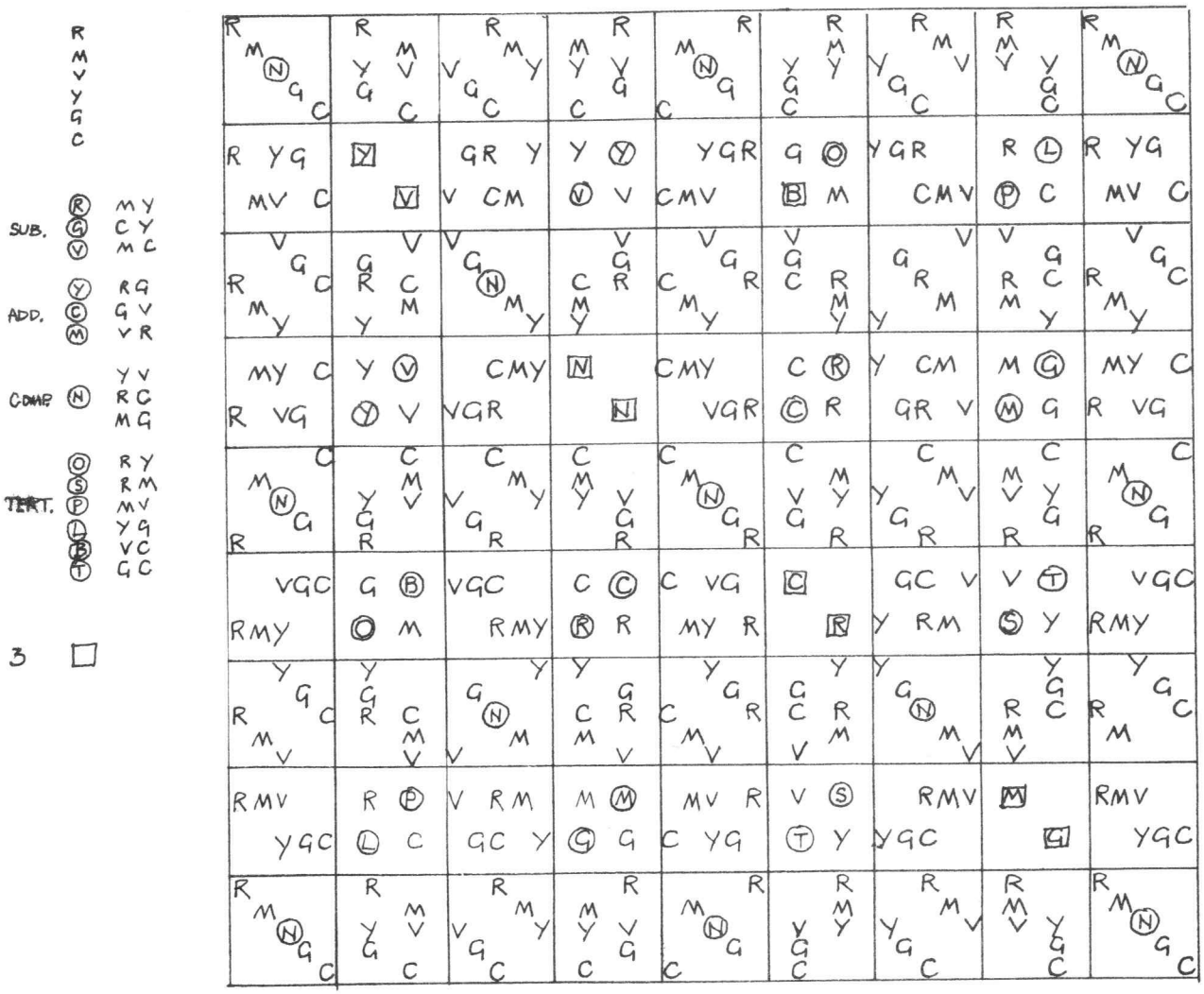
Constructions, Arts Council.

1969: 'Systeemi', Amos Anderson Museum, Helsinki.

1971: 'Matrix', Arnolfini Gallery, Bristol.

1972-73: 'Systems', Whitechapel Gallery, London and Arts Council Tour.

1973: Plus Kern, Ghent.



Jean Spencer

Born 1962. Studied at Bath Academy of Art, Corsham.
Now teaching Art Dept., Berkshire College of Education.

One man exhibitions.

1988: Bear Lane, Oxford.

1986: University of Sussex, Brighton.

Some recent group exhibitions.

1987: Arts Gallery, Leeds:

'Ink', Senior, Progressive', Arts Council;

Contributions, Arts Council.

1986: 'Systems', Acme Studios, Whitechapel.

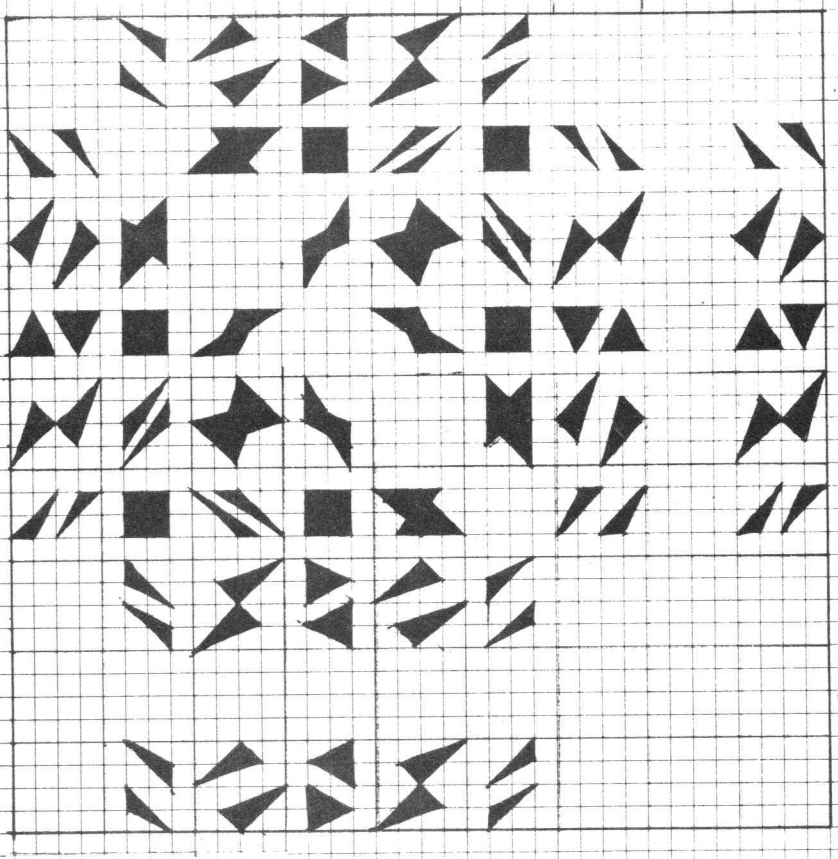
1971: 'Material, Anti-Trial Gallery, Bristol.

1970-71: 'Breakaway', Whitechapel Gallery, London and Arts Council Tour.

1973: Blue Kern, Queen.

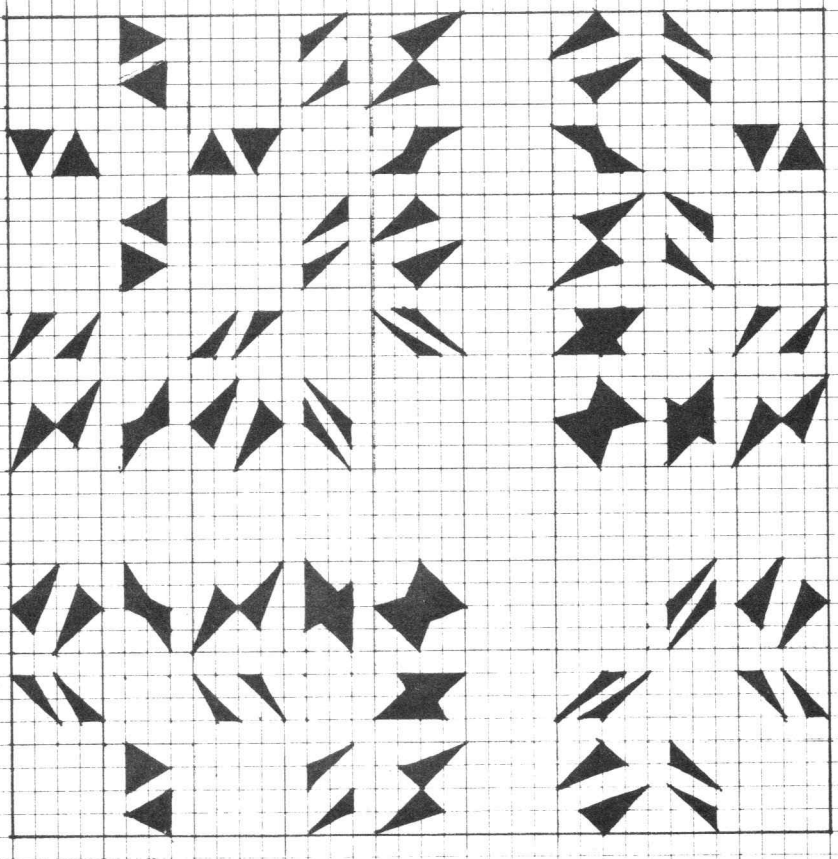
M O V

G Y C



Y R M

C V G



Jeffrey Steele

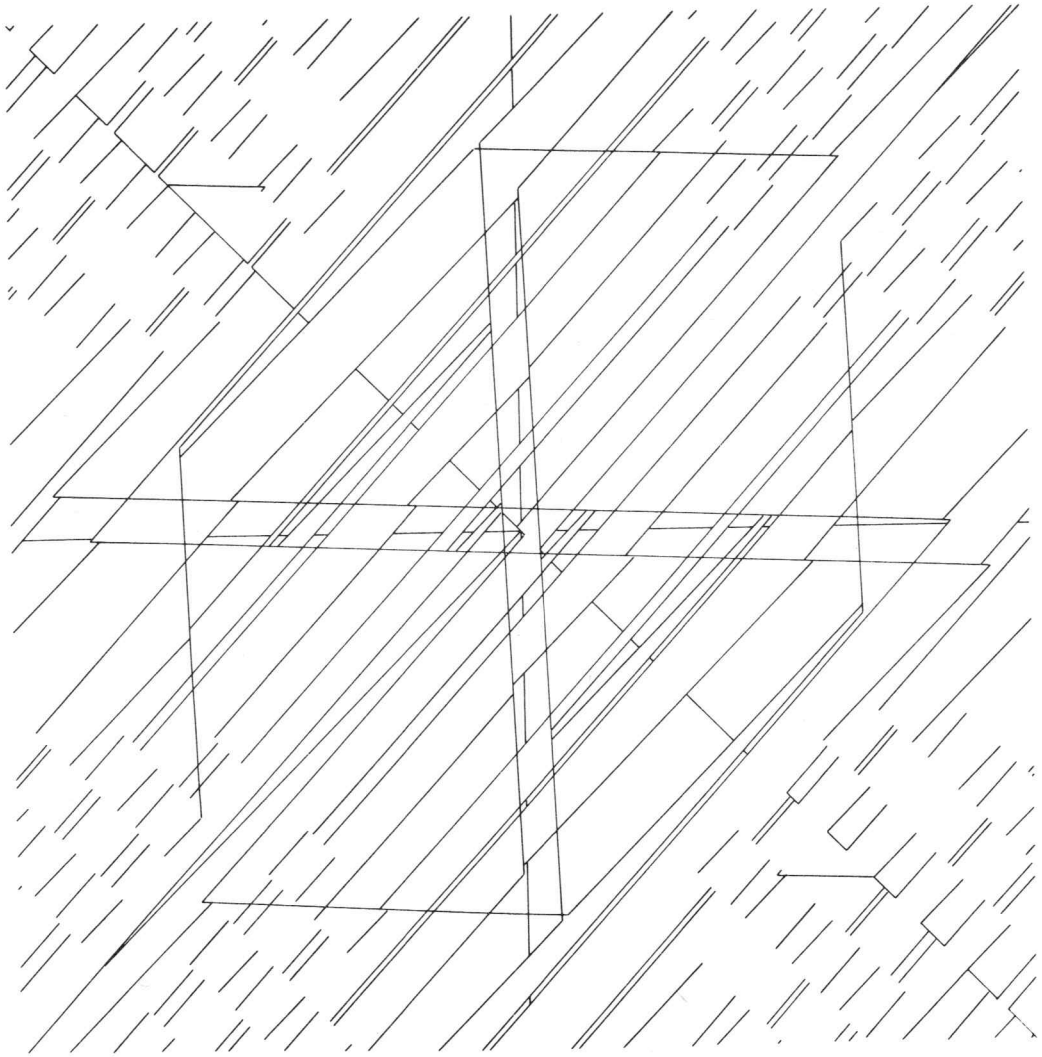


Fig. 1.
Sg I 10. D III 2. M I o. Sy I 1. O I 2. Nk I 10. Sx I 1.
F I 1. 20. 4. 72

Jeffrey Steele Activity 1931 - 1973 (selected)

1933 - 1973	Drawing
1933 - 1957	Figurative Painting
1953 - 1961	Menial Manual and Clerical Activity
1957 - 1959	High Entropy Painting
1959 - 1973	Geometric Abstraction
1960 - 1967	Black and White "Optical" Paintings
1961 - 1962	Relief Constructions
1961 - 1973	Teaching and Lecturing
1967 - 1972	Curvilinear Paintings with Complex Systems
1968 - 1969	Administration
1970 - 1973	Diverse Activity
1971 - 1973	"Syntagm" (Sg.) Series of Drawings and Paintings

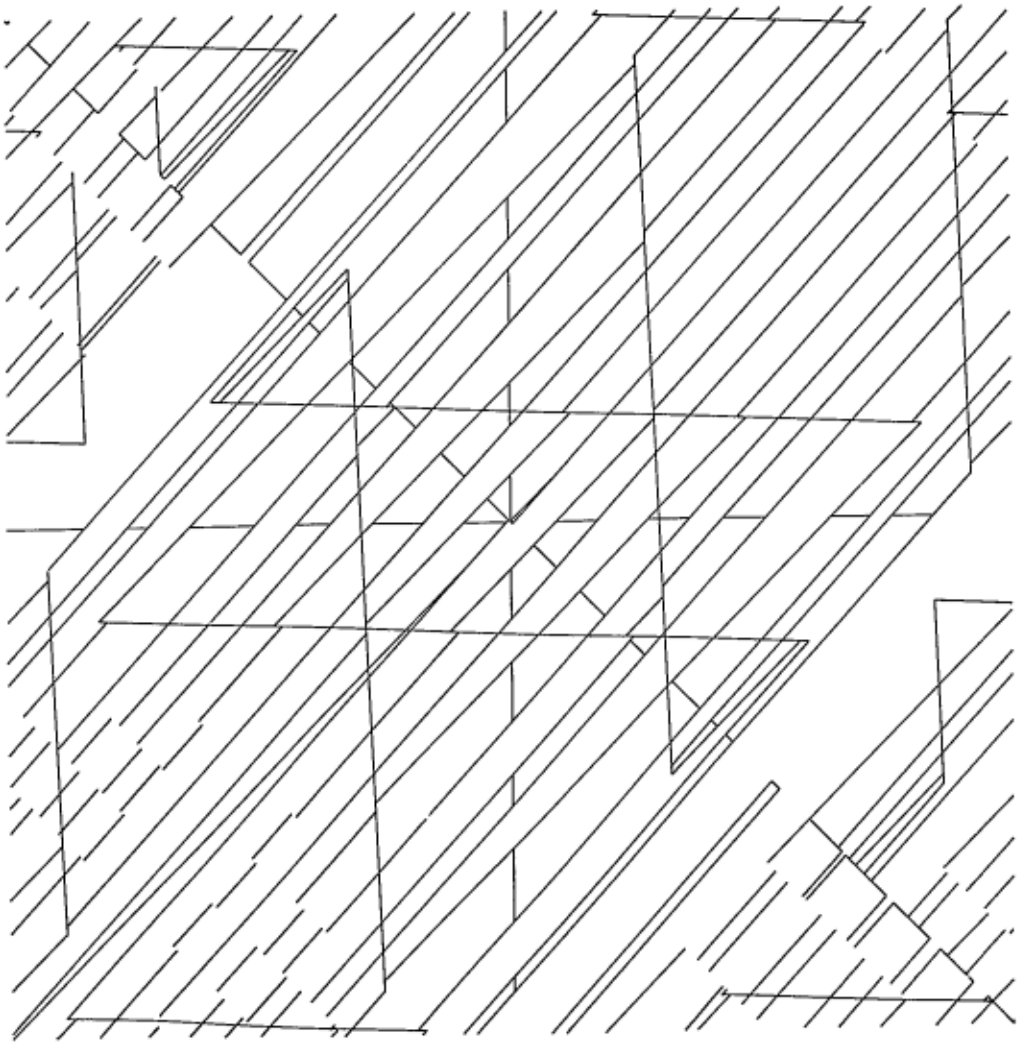


Fig. 2.
Sg I 11. D IV 1. M I o. Sy I 1. O III 1. Nk I 11. Sx I 1. F I 1. 5. 5. 72.

Jeffrey Steele.

Six drawings from series Sg I 1.....

1.	Sg I 10.	D III 2.	M I o.	Sy I 1.	
	O I 2.	Nk I 10.	Sx I 1.	F I 1.	30. 4. 72 (Fig. 1).
2.	Sg I 11.	D VI 1.	M I o.	Sy I 1.	
	O III 1.	Nk I 11.	Sx I 1.	F I 1.	5. 5. 72.(Fig. 2).
3.	Sg I 12.	D IV 2.	M I o.	Sy I 1.	
	O II 2.	Nk I 12.	Sx I 1.	F I 1.	1. 6. 72.
4.	Sg I 16.	D I 6.	M I 6.	Sy I 1.	
	O o o.	Nk I 16.	Sx I 1.	F I 1.	9. 7. 72.
5.	Sg I 19.	D V 6.	M II 6.	Sy I 1.	
	O o o.	Nk I 19.	Sx I 1.	F I 1.	20.10. 72.
6.	Sg I 22.	D VII 1.	M I o.	Sy I 1..	
	O IV 1.	Nk I 22.	Sx I 1.	F I 1.	20. 6. 73.

Sg. = Syntagm.
D. = Distribution.
M. = Mapping.
Sy. = System.
O. = Operation.
Nk. = Network.
Sx. = Syntax.
F. = Format.

Original drawings are in ink on paper, image size 20" x 20", paper size 25" x 25". A set of mechanical duplications, image size 6" x 6", paper size 8" x 8", of drawings from series Sg I, with a structural explanation, is available from the artist at the Department of Fine Art, Portsmouth Polytechnic, Lion Terrace, Portsmouth.

The "Systems" group of artists will be holding a short course entitled "ART SYSTEMS AND CREATIVE PROCESS", in the summer vacation of 1974 from 29th July to 9th August.
This course is arranged in collaboration with the Perception and Communication Studies Unit of the PCL Department of Architecture, and will use the facilities and resources of the Department.
Further details can be obtained from the Short Course Unit PCL, 35 Marylebone Road, London NW1 5LS.

The Systems II Exhibition has been mounted with the combined assistance of The Polytechnic of Central London's Department of Architecture - (Perception and Communication Studies Units), The Design Activity International Conference and the PCL Centre for Extra Mural Studies.

Richard Allen
Exhibition Consultant PCL